(E) REMARKS

Objections to the Specification

The Examiner objected to the declaration submitted by the applicant on the grounds that it does not include a legible signature or execution date. Applicant submitted the entire application using the Electronic Filing System and suspects that the problem is related to his use of that system. A new declaration is submitted herewith.

The Examiner objected to the drawings under 37 C.F.R. § 1.84(p)(5). Fig. 2 has been amended to include reference element 100. FIGS. 3 and 4 have been amended to add reference element 210 and a complete set of replacement sheets have been submitted.

The Examiner also objected to the drawings under 37 C.F.R. § 1.84(p)(4) on the grounds that reference numeral 212 designated multiple items, i.e. the inner gradient coil, conductive strips and hollow conductive strips.

The applicant has amended paragraph 17 of the Detailed Description in accordance with the Examiner's suggestion to include the following sentence: "The inner gradient coils 212 are comprised of conductive strips and hollow conductive strips and are occasionally referred to as such in the following paragraphs."

The Examiner also objected to the Abstract of the Invention on the grounds that five and a half extraneous lines of text appear. These lines of text do not appear on the applicant's copy of the application. However, the applicant has submitted a clean copy of the Abstract.

Rejections of the Claims - Anticipation

The Examiner rejected claims 1, 2, 8, 9, 15 and 20 through 25 under 35 U.S.C. § 102(b) on the grounds that they are anticipated by U.S. Patent No. 6,369,571 to Damadian et al. (the '571 reference). More specifically, the Examiner rejected claims 1, 8, 15 and 20 on the grounds that Damadian teaches "a transverse gradient coil comprising: a strip of electrically conductive material having a hollow portion such that fluid is permitted to flow through the conductive material, among other reasons. As an initial matter the coil shown in FIG. 17 of the '571 reference is not a gradient coil. Instead, FIG. 17 shows a resistive magnet of an MRI machine employing a solenoid coil to "tweak" the magnetic field of the permanent magnet. This solenoid coil surrounding the natural iron magnet then consists of many windings or coils of wire wrapped around a cylinder or bore through which an electric current is passed. This causes a magnetic field to be generated. These permanent magnets are notoriously susceptible to even the smallest variation in temperature and thus continuous temperature control is required.

The permanent magnets in the '571 reference create very uniform, or homogeneous, magnetic fields of incredible strength (.5 – 2.0 Tesla) and stability which are critical for high-quality imaging. Another type of magnet found in every MRI system is called a gradient magnet. There are three gradient magnets inside an MRI system. These magnets are very, very low strength compared to the main magnetic field; they may range in strength from 180 gauss to 270 gauss, or 18 to 27 millitesla. To create an image, the main magnet immerses the patient in a stable and very intense magnetic field, and the gradient magnets create a variable field. The gradient magnets are

arranged in such a manner inside the main magnet that when they are turned on and off very rapidly in a specific manner, they alter the main magnetic field on a very local level which permits the operator to view exactly which area he or she wants a picture of. Unfortunately, scan quality and patient throughput were limited by thermal inefficiencies in the gradient coils. The present invention increases thermal efficiency permitting higher energy scans, new types of scans and high patient throughput.

"A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference." Verdegaal Bros. v. Union Oil Co. of California, 814 F. 2d 628, 631, 2 U.S.P.Q. 2d 1051, 1053 (Fed. Cir. 1987). The applicant respectfully submits that the '571 reference does not disclose the use of hollow, conductive gradient coils, and thus does not anticipate the current application. The Examiner specifically admits at p. 7 of the Office Action that the '571 reference *does not teach* the use of a hollow conductor used in a gradient coil. Accordingly, independent claims 1, 8, 15 and 20 are believed to be in position for allowance. Dependent claims 2, 9 and 21 through 25 are also believed to be allowable, in view of their dependence on allowable base claims.

Rejections of the Claims - Obviousness

The Examiner rejected claims 3 through 7, 10 through 14 and 16 through 19 under 35 U.S.C.§ 103(a) as being unpatentable over the '571 reference. In order to establish *prima facie* obviousness of a claimed invention, all of the claim limitations must be taught or suggested by the prior art. *In re Royka*, 490 F. 2d 981, 180 U.S.P.Q. 580 (C.C.P.A. 1974). "All words in a claim must be considered in judging the

patentability of that claim against the prior art." *In re Wilson*, 424 F. 2d 1382, 1385, 165 U.S.P.Q. 494, 496 (C.C.P.A. 1970). As expressly pointed out by the Examiner, not all of the claim limitations are met by the '571 reference. *On these grounds alone*, it is believed that the claims are in position for immediate allowance.

There are four basic considerations to apply to obviousness rejections; (A) The claimed invention must be considered as a whole; (B) The references must be considered as a whole and must suggest the desirability and thus the obviousness of making the combination; (C) The references must be viewed without the benefit of impermissible hindsight vision afforded by the claimed invention and (D) Reasonable expectation of success is the standard with which obviousness is determined.

The '571 reference does not teach or suggest the use of fluid cooled gradient coils. Nothing in the '571 reference even suggests that a heat dissipation problem exists with gradient coils. The applicant respectfully suggests that the Examiner has used impermissible hindsight to come to the conclusion that using cooling channels in a transverse gradient coil is obvious or anticipated.

The applicants have provided a new, useful and non-obvious improvement to cool the patient area of an MRI system. For their ingenuity, they are entitled to the protection of the United States patent laws. Allowance of the claims is respectfully requested.

Respectfully submitted,
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